

FEATURES AND STATE OF DEVELOPMENT OF FREIGHT AND PASSENGER TRANSPORTATION BY RAIL IN THE COUNTRIES OF THE VISEGRAD GROUP

The article analyzes the features and state of development of freight and passenger transportation by rail in the countries of the Visegrad Group. It is based on the confirmation of the fact that the countries of the region traditionally have a modal split in freight and passenger traffic between rail and road transport. The author recorded that the share of rail transport in the transportation of goods and passengers in the countries of the Visegrad Group is declining or remains stable, and the share of road transport is growing. Thus, the peculiarity of railway transport in the region is that it is gradually losing its popularity and share at the background of road transport, and this tendency has been observed for several decades, i.e. from the collapse of the regimes of “real socialism” up to today. In this context, it was argued that even despite variable attempts, the railway sector of the Visegrad Group countries is characterized by a severe recession primarily as a result of the collapse of the planned economy, resulting in a sharp decline in rail traffic.

Keywords: transport, railway transport, transportation, the countries of the Visegrad Group.

CECHY I STAN ROZWOJU PRZEWOZU TOWARÓW I PASAŻERÓW KOLEJOWYM W KRAJACH GRUPY WYSZEHRADZKIEJ

Artykuł jest analizą cech i stanu rozwoju kolejowych przewozów towarowych i pasażerskich w krajach Grupy Wyszehradzkiej. Opiera się na potwierdzeniu faktu, że w krajach tego regionu tradycyjnie istnieje podział modalny w ruchu towarowym i pasażerskim i na transport kolejowy i drogowy. Autor odnotował, że udział transportu kolejowego w przewozach towarów i osób w krajach Grupy Wyszehradzkiej przejawia tendencję spadkową lub pozostaje stabilny, zaś udział transportu drogowego ma tendencję zwykłą. Specyfiką transportu kolejowego w regionie jest stopniowy spadek popytu i udziału w porównaniu z transportem drogowym, a tendencja ta jest obserwowana od kilkudziesięciu lat, tj. od upadku reżimów „realnego socjalizmu” aż do dziś. W tym kontekście argumentowano, że sektor kolejowy krajów Grupy Wyszehradzkiej, nawet pomimo podejmowania różnorodnych prób charakteryzuje się dotkliwą recesją, przede wszystkim w wyniku załamania gospodarki planowej, skutkującej gwałtownym spadkiem ruchu kolejowego.

Słowa kluczowe: transport, transport kolejowy, transport, kraje Grupy Wyszehradzkiej

ОСОБЛИВОСТІ ТА СТАН РОЗВИТКУ ВАНТАЖНИХ І ПАСАЖИРСЬКИХ ПЕРЕВЕЗЕНЬ ЗАЛІЗНИЧНИМ ТРАНСПОРТОМ У КРАЇНАХ ВИШЕГРАДСЬКОЇ ГРУПИ

У статті проаналізовано особливості й стан розвитку вантажних і пасажирських перевезень залізничним транспортом у країнах Вишеградської групи. Це зроблено на підставі підтвердження факту, що для країн регіону традиційно властивий модальний розкол у вантажних і пасажирських перевезеннях між залізничним та автомобільним транспортом. Зафіксовано, що частка залізничного транспорту в перевезенні вантажів, товарів і пасажирів у країнах Вишеградської групи скорочується або залишається стабільною, а частка автомобільного транспорту зростає. Відтак особливість залізничного транспорту у регіоні полягає в тому, що він поетапно втрачає свою популярність та частку на тлі розвитку автомобільного транспорту, і така тенденція прослідковується декілька десятиліть, тобто від моменту колапсу усіх режимів «реального соціалізму» і до сьогодні. У цьому контексті аргументовано, що навіть попри спроби варіативного реформування залізничний сектор країн Вишеградської групи сьогодні характеризується серйозною рецесією передусім у результаті розпаду планової економіки, внаслідок чого обсяги перевезень залізницею різко скоротились.

Ключові слова: транспорт, залізничний транспорт, перевезення, країни Вишеградської групи.

For the countries of the Visegrad Group – Poland, Slovakia, Hungary and the Czech Republic – as well as for all European countries and most countries of the world, traditionally there is a modal split of freight and passenger traffic between rail and road transport. This split became especially pronounced from the moment of the collapse of the regimes of “real socialism”, when the format of the relationship between different modes of transport was changed and the parameters of state regulation of the transport system in the region were significantly limited. The fact is that it was at the turn of the 80’s – early 90’s of the 20th century the transport system of the Visegrad Group countries has significantly clustered both in its diversity and structuring, and in its approaches to its regulation and regulation. Against this background, not surprisingly, the importance and potential of mainly rail transport was significantly limited, both in freight and passenger transport, as in general the transport systems of the Visegrad countries began to become more liberal and personalized, rather than centralized, as before¹, and therefore began to focus mainly on road transport. And this despite the fact that during the regimes of “real socialism” railway transport was positioned as the

¹ Pucher J., Buehler R., *Transport Policies in Central and Eastern Europe*, Conference paper, źródło: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.414.564&rep=rep1&type=pdf> [odczyt: 20.10.20].

main and main in the socio-economic development of the region, both infrastructural and relatively in terms of passenger and freight flows compared to other modes of transport².

All this means that against the background of the formed modal split in freight and passenger transport between rail and road transport, the place of the railway sector (its systems, logistics and infrastructure) turned out to be very specific, and therefore it needs attention and structuring in research and analytical terms actually and the offered scientific article is directed.

The stated issues are largely the focus of scientific and research attention of such scientists as V. Cempirek, P. Vrbova and E. Zakorova³, O. Cherednychenko⁴, A. Dolinayova and J. Camaj⁵, M. Hornak⁶, Z. Jerney and K. Bodnar⁷, A. Kelemen-Erdos⁸, M. Lang, M. Laperrouza and M. Finger⁹, E. Lysytsa¹⁰, A. Lukacs¹¹, C. Nash¹², D. Seidenglanz¹³, B. Szekely and O.-P. Hilmola¹⁴, J. Taczanowski¹⁵.

All these and other scholars inevitably state that the current state of development of the railway sector in the Visegrad countries lags far behind its past development during the centralized regimes of “real socialism”, even though some (even significant) modernization steps have been taken in the region in this direction. The fact is that in the Visegrad Group in the early-mid 90's of the 20th century, i.e. in the post-communist period, there was an immanent internal competition between road and rail transport as two main pillars and even clusters of freight and passenger traffic – periods of present and past. Even though the development of

² Hunya G., Transport and Telecommunications Infrastructure in Transition, “*Communist Economies & Economic Transformation*” 1995, vol 7, nr 3, s. 369–384.

³ Cempirek V., Vrbova P., Zakorova E., *The Possibility of Transferring the Transport Performance on Railway Transport*, Presented at LOGI 2017: MATEC (Web of Conferences).

⁴ Cherednychenko O., Shliakhy restrukturyzatsii zaliznychnoho transportu v suchasnykh umovakh na prykladi krain Yevropy, “*Visnyk ekonomiky transportu i promyslovosti*” 2009, vol 26, s. 44–51.

⁵ Dolinayova A., Camaj J., Kanis J., Charging railway infrastructure models and their impact to competitiveness of railway transport, “*Transport Problems*” 2017, vol 12, nr 1, s. 139–150; Dolinayova A., Loch M., Camaj J., Liberalization of the railway freight market in the context of a sustainable transport system, “*Transportation Research Procedia*” 2016, vol 14, s. 916–925.

⁶ Hornak M., Pozicia zeleznicnej dopravy na Slovensku – stagnacia alebo upadok?, “*Narodohospodajsky obzor*” 2006, vol 4, s. 16–24.

⁷ Jerney Z., Bodnar K., Action Plan on the Competitiveness of the Railway Freight Transport in the Visegrad (V4) Cooperation Area, “*Lucrari Ftiinifice*” 2018, vol 20, nr 2, s. 65–70.

⁸ Kelemen-Erdos A., *A kozforgalnu kozlekedesi szolgaltatas es piac vizsgalata marketing es femtarthatosagi nezopontbol*: PhD thesis, Wyd. BMGE GTK2014; Kelemen-Erdos A., Measuring Railway Market Attractiveness: Evidence from Visegrad Countries, “*Acta Polytechnica Hungarica*” 2011, vol 8, nr 5, s. 151–170.

⁹ Lang M., Laperrouza M., Finger M., The Effects of Increased Competition in a Vertically Separated Railway Market, “*Institute for Strategy and Business Economics Working Paper Series*” 2010, nr 131.

¹⁰ Lysytsa E., Rynochnye uslovia razvytyia estestvennykh monopolii v stranakh Tsentralnoi y Vostochnoi Evropy (na primere zheleznodorozhnoho transporta) // “*Visnyk Pryzovskoho Derzhavnoho Tekhnichnogo Universytetu (Serbia: Ekonomichni nauky)*” 2011, vol 2, nr 22, s. 36–44.

¹¹ Lukacs A., *Shifting freight from truck to rail, based on Hungary's experience*, Wyd. Clean Air Action Group 2010.

¹² Nash C., Passenger Railway Reform in the Last 20 Years – European experience reconsidered, “*Research in Transportation Economics*” 2008, vol 22, nr 1, s. 61–70.

¹³ Seidenglanz D., *International Railway Transport in the Czech Republic and in Slovakia*, [w:] *History of Transport, Traffic, and Mobility*, Wyd. Université Paris 1 2006, s. 1–9.

¹⁴ Szekely B., Hilmola O.-P., *Analysis from the Liberalisation Process of Swiss, Japanese, Polish and Hungarian Railways*, [w:] Hilmola O.-P. (ed.), *Third Research Meeting Held at Kouvola – Value Adding Role of Logistics in Northern Europe*, Wyd. Lappeenranta University of Technology 2007, s. 171–205.

¹⁵ Taczanowski J., *A comparative study of local railway networks in Poland and the Czech Republic*, [w:] Szymanska D., Bieganska J. (eds.), *Bulletin of Geography. Socio-economic Series: No. 18*, Wyd. Nicolaus Copernicus University Press 2012, s. 125–138.

rail transport in the countries of the region has begun to be coordinated both nationally and transnational, in particular through the so-called Trans-European Railways (TER– Trans-European Railways) project¹⁶.

Moreover, even though in the early 90's of the 20th century. The Visegrad countries have adopted European standards in their rail transport development projects, but in practice the sector has lacked investment to modernize it. The main reason for this was the lack of a realistic strategy for the development of railway transport, which could respond to a decrease in demand for railway services and increase the cost of services in the railway network. As a result, revenues from railway services initially, although as in the period of “real socialism” regimes, did not even cover the costs of operating railway transport. This was not prevented by the fact that by the mid-90's of the 20th century railways in the Visegrad countries, especially in Poland and Hungary, but to a lesser extent in Slovakia and the Czech Republic, began to be partially privatized or communalized¹⁷.

Therefore, it is generally believed that the relatively poor condition of large state-owned carriers and the relative (relative to the past) degradation of rail transport in the Visegrad countries are associated with a sharp reduction in budget subsidies. But in practice, these processes have had a huge impact on the decline in demand for transport services in the transportation of both goods (especially public transport) and passengers. In addition, in the 90's of the 20th century there was a clear positive feedback in the region between declining demand and limiting government subsidies (and the associated increase in transport rates). In addition, it is believed that among the factors that contributed to the decline of the railway and in return to the car boom in the countries of the analyzed region, was the change in the ratio of fuel prices and public transport tariffs. In addition, rapid privatization and “shock therapy” did not lead to a sharp decentralization of public / state owned transport. However, against this background, as noted above, the negative consequences of activities related to the restructuring of transport concerned mainly the railway sector, which immediately began to operate under the scheme of saving resources and funds. The situation was complicated by the fact that investment in rail transport was critically reduced, while investment in road transport was relatively increasing, which initially established and later intensified the modal split in the transport sector. Accordingly, the effect of transport logistics and infrastructure was to bring to the fore both road and rail transport, but with constant competition and division between them and the lag of the railway sector, especially at the beginning of the 21st century (see Table 1).

¹⁶ Hunya G., Transport and Telecommunications Infrastructure in Transition, “*Communist Economies & Economic Transformation*” 1995, vol 7, nr 3, s. 369–384.

¹⁷ Hook W., The political economy of post-transition transportation policy in Hungary, “*Transport Policy*” 1999, vol 6, s. 207–224.

Table 1. Modal split between rail and road transport in the Visegrad countries: on the basis of mortgage rates of freight and passenger traffic (in the dynamics, as of 2006–2016)

Year	Poland	Slovakia	Hungary	Czech Republic
The rate of transportation of goods and cargo by rail, in 1000 tons				
2006 p.	291 394	52 449	54 705	97 491
2009 p.	200 819	37 603	42 277	76 715
2012 p.	230 878	42 599	46 884	82 968
2015 p.	224 320	47 358	50 333	97 280
2016 p.	222 523	47 548	50 047	98 034
Average data	233 987	45 511	48 849	90 498
The rate of transportation of goods and cargo by road, in 1000 tons				
2006 p.	897 414	181 521	250 989	444 644
2009 p.	1 170 478	163 491	229 808	370 115
2012 p.	1 245 053	132 270	165 514	339 314
2015 p.	1 264 960	147 225	198 744	438 907
2016 p.	1 313 657	156 179	197 759	431 889
Average data	1 178 312	156 137	208 563	404 974
The rate of passenger transport by rail, in million passengers / km				
2006 p.	18 240	2 213	–	6 922
2009 p.	18 128	2 264	8 003	6 472
2012 p.	17 110	2 459	7 769	7 196
2015 p.	17 024	3 411	–	8 125
2016 p.	18 753	3 484	–	8 738
Average data	17 851	2 766	7 886	7 491

Źródło: *Transport Database*, Wyd. Eurostat, źródło: <https://ec.europa.eu/eurostat/web/transport/data/database> [odczyt: 20.10.20]; *Transport infrastructure investment and maintenance spending*, Wyd. OECD Statistics, źródło: https://stats.oecd.org/Index.aspx?&datasetcode=ITF_INV-MTN_DATA [odczyt: 20.10.20].

Based on various statistics, it was found that the key indicators of the decline of transport infrastructure on the railway in the post-communist period were: transportation of goods and freights by rail (all countries in the region), transportation of passengers by rail (primarily Hungary), length and density of railways (especially Poland) and Slovakia), number of locomotives and wagons (in all countries of the region). Although the situation with the length and percentage of electrified railways in the region has improved somewhat over the last decade (with the possible exception of Slovakia). Statistics improved slightly during the period when the Visegrad Group countries integrated into the EU, as during 2006–2016 the share of rail transport in freight, goods and passengers in the region either decreased (in some countries) or remained stable, and the share of road transport, instead, is constantly growing. This is evident from the fact that during the analyzed period, rail transport accounted for an average of 17 percent of all freight and goods in Poland, 23 percent in Slovakia, 19 percent in Hungary,

and 18 percent in the Czech Republic. At the same time, the share of rail transport in the transportation of goods, cargo or passengers has recently increased (particularly since 2012), as it previously showed much more negative dynamics (see Table 1).

All this makes it possible to state that even despite the plan to liberalize the European rail and freight market the relevant measures remain quite symbolic, without significantly changing the institutional context in which players operate in foreign and domestic markets and without offering institutional results, which must be achieved¹⁸.

Although, in contrast, suggestions about liberalization of European rail transport has been on the agenda of the European Commission since the mid-1970s of the 20th century, but the relevant legislative proposals have not overcome the initial stage of the legislative process etc. There were and still are several reasons for this. Firstly, there are significant difficulties in reaching an agreement, as rail transport (as opposed to road transport), especially in such countries as Poland and Hungary, was not only a subject of economic activity, but was also seen as a provider of socially significant services with significant social obligations, which during the regimes of “real socialism” were supported for political reasons. has been on the Second, the European Commission had very limited legal and institutional powers to overcome the resistance of EU member states. Accordingly, since the start of the reform of the railway sector (since the 1990s), the main goal of this process has been to change the policy-making environment in the EU member states, in particular by increasing support for the proposed reform program. However, this did not have a significant effect, but instead exacerbated the modal split between rail and road transport in the Visegrad Group.

Thus, a notable feature of railway transport in the countries of the analyzed region is that it is gradually losing its popularity and modal share against the background of road transport, and this trend has been observed for about thirty years, i.e. from the collapse of all “real socialism” till now. This is reflected in the fact that the railway sector of the Visegrad Group countries today is characterized by a serious recession, primarily as a result of the collapse of the planned economy, as a result of which rail traffic has declined and is still declining as major customers lose. This is complemented by the fact that the governments of the region immediately after the collapse of the regimes of “real socialism” took, in contrast, various measures to deregulate the road transport sector, which of course created fierce competition, especially for railways for the rest of traffic. All these factors have created serious problems for the railway sector in terms of financial situation and profits and expenditures, market positions, operational indicators and asset management, and etc.

There were many reasons for this, but it is still critical to find out the historical and current state of development of the railway transport industry since the late 80's of the 20th century and to this day. Especially against the background of the processes of liberalization of the

¹⁸ Prokopenko L., Rudik O., Bashtannyk V., *Protses yevropeizatsii ta yoho osoblyvosti v postkomunistychnykh krainakh Tsentralnoi ta Skhidnoi Yevropy*, Wyd. NADU 2010.

passenger and freight rail market (several so-called “liberalization packages”) in the Visegrad Group countries, which, although initiated and even implemented from the time of preparation for accession to the EU, had little effect on the growth of the share of railway transport in total freight and passenger turnover¹⁹.

This was one of the key paradoxes of the Visegrad Group, as they made the transition from a planned to a market economy and managed to achieve significant and even colossal indicators of socio-economic development, but no progress was made in the field of railway transport²⁰. The fact is that despite the partial reform of the railway, in particular through its vertical and horizontal distribution, reorganization, open access to infrastructure, freight transport and international liberalization of passenger transport, competition in this area has been partially strengthened, but the transport market continued to be dominated by former operators.

This was exacerbated by the fact that several stages and steps of railway reform in the European market and in the region in particular did not create targeted regulatory policies in the industry, although it was hoped that access to infrastructure should be the basis for competition and market opening / expansion of the transportation. Thus, the failure of the first stage of railway reform in the region was the failure to fully separate railway companies and railway infrastructure from transport services. As a result, subsidies for rail services were reduced and several non-core business operations were outsourced²¹. Subsequently, the failures were manifested in the fact that no open market and competition were created, which were predicted to be achievable only in the long run²². As a result, the situation on rail (especially freight, to a lesser extent passenger) transport began to exist with many private participants, but the lack of internal modal competition continued, mainly due to the quality of services, as a result of which rail transport simply couldn't and still can't compete with operators in road transport²³.

As a result, neither the state monopolies nor the existing private market in railway transport proved to be effective, which in turn led to the fact that road (especially freight) transport first became, and later remained dominant in the field, even though that it showed and still shows more negative externalities. This is most true for Hungary and Slovakia, and to a much lesser extent – for Poland and the Czech Republic, where intramodal competition on the railways can still be traced, especially in the diversification of passenger traffic²⁴.

¹⁹ Kelemen-Erdos A., Measuring Railway Market Attractiveness: Evidence from Visegrad Countries, *“Acta Polytechnica Hungarica”* 2011, vol 8, nr 5, s. 151–170.

²⁰ Kelemen-Erdos A., Measuring Railway Market Attractiveness: Evidence from Visegrad Countries, *“Acta Polytechnica Hungarica”* 2011, vol 8, nr 5, s. 151–170.

²¹ Hunya G., Transport and Telecommunications Infrastructure in Transition, *“Communist Economies & Economic Transformation”* 1995, vol 7, nr 3, s. 369–384.

²² Eisenkopf A., The Liberalisation of Rail Transport in the EU, *“Intereconomics”* 2006, vol 41, nr 6, s. 292–313.

²³ Lang M., Laperrouza M., Finger M., The Effects of Increased Competition in a Vertically Separated Railway Market, *“Institute for Strategy and Business Economics Working Paper Series”* 2010, nr 131.

²⁴ Szekely B., Hilmola O.-P., *Analysis from the Liberalisation Process of Swiss, Japanese, Polish and Hungarian Railways*, [w:] Hilmola O.-P. (ed.), *Third Research Meeting Held at Kouvola – Value Adding Role of Logistics in Northern Europe*, Wyd. Lappeenranta University of Technology 2007, s. 171–205; Szekely B., Liberalisation of the Railway Industry in Europe: Toward a Sustainable System through Process View, *“International Journal of Sustainable Economy”* 2009, vol 1, nr 2, s. 167–185.

In general, the overall result was that almost all Visegrad countries, with the exception of Hungary, began to apply higher infrastructure charges and taxes to rail freight, in particular compared to passenger rail. And the reason for this, as some scholars note, was that rail transport in the region has historically been characterized by a lack of national transport strategies, as well as low productivity and operational efficiency in the period leading up to liberalization. As a result, in the Visegrad countries, market liberalization of rail transport has taken place or at least begun, and intermodal efficiencies have been introduced or started to be implemented, but only partially, making the region's railway transport sector relatively attractive to society economic players, yielding in this respect to road transport.

Table 2. Features of development of logistics and infrastructure of railway transport in the countries of the Visegrad group (In dynamics, as of 2000–2016)²⁵

Infrastructure development indicator	Poland				Slovakia				Hungary				Czech Republic			
	2000	2007	2012	2016	2000	2007	2012	2016	2000	2007	2012	2016	2000	2007	2012	2016
Length of railway tracks, km	H.д.	20 107	20 094	19 132	H.д.	3 629	3 631	3 206	H.д.	7 808	7 486	7 811	H.д.	9 588	9 570	9 564
Length of electrified railway tracks, km	H.д.	11 898	11 920	11 874	H.д.	1 578	1 586	1 587	H.д.	2 738	2 982	3 018	H.д.	3 060	3 217	3 236
Percentage of electrified railway tracks, %	52,8	59,2	59,3	62,1	41,9	43,5	43,7	49,5	34,8	35,1	39,8	38,6	30,4	31,9	33,6	33,8
Density of railway tracks, in % per 100 square km	7,4	6,3	6,4	6,0	7,6	7,5	7,5	7,5	8,9	8,9	8,7	8,7	12,1	12,3	12,3	12,3
Number of locomotives of all types, №	4 027	4 427	4 113	4 004	1 209	1 057	973	940	1 107	1 036	1 163	1 170	2 829	2 414	2 088	2 003
Number of electric locomotives, №	1 774	1 847	1 849	1 814	556	488	485	485	478	491	540	584	1 029	971	864	814
Number of locomotives on diesel, №	2 212	2 580	2 264	2 190	653	569	488	455	613	523	595	573	1 778	1 416	1 192	1 156
Number of cars of all types №	H.д.	104 982	91 483	87 598	H.д.	27 538	16 384	15 786	H.д.	12 966	11 066	9 145	H.д.	47 659	34 091	34 596

Źródło: *Transport infrastructure investment and maintenance spending*, Wyd. OECD Statistics, Źródło: https://stats.oecd.org/Index.aspx?&datasetcode=ITF_INV-MTN_DATA [odczyt: 20.10.20]; *Transport Database*, Wyd. Eurostat, Źródło: <https://ec.europa.eu/eurostat/web/transport/data/database> [odczyt: 20.10.20]; *Carriage of goods by road, mln tonne-km, year 2018*, Wyd. UNECE, Źródło: <https://w3.unece.org/PXWeb/en> [odczyt: 20.10.20].

In summary, it is established (see Table 2 in detail) that the main problems of the railway sector in the region are and remain the poor condition of railways and related properties, as

²⁵ https://stats.oecd.org/Index.aspx?&datasetcode=ITF_INV-MTN_DATA#

well as rolling stock, which leads to poor quality of service²⁶. This is reflected in the fact that in the Visegrad countries: the length of railways is gradually decreasing (Poland and Slovakia, stable situation in Hungary and the Czech Republic), although the length of electrified railways is almost unchanged (except for Hungary and the Czech Republic, where it increases slightly), as a result of which the percentage of electrified railways in the region is growing, but this growth is relative and occurs only due to the reduction of all railways (most of all in Poland and Slovakia and much less in Hungary and the Czech Republic); the density of railway tracks is extremely low (especially in Poland, Slovakia and Hungary, and the least in the Czech Republic); the number of locomotives of all types is constantly and steadily declining (although we are seeing some progress in Hungary and Poland, especially in terms of the number of locomotives on electricity); the number of cars of all types is constantly decreasing (most noticeable in the Czech Republic and Slovakia, less critical in Poland and Hungary).

Such phenomena are often determined by the fact that the railway industry in the region today is still characterized by a fixed structure and management. The fact is that governments have previously sought and still seek to privatize largely non-core railways and, in some cases, the freight sector. The fact is that governments have previously sought and continue to seek to privatize largely non-core railways and, in some cases, the freight sector. And investors are primarily other railway companies, although other operators also have the necessary experience and access to significant finances / resources. At the same time, the situation within the development of railway transport in the Visegrad Group countries is quite differentiated and this is due to the variable approaches to the development and reform of this sector, including in the past²⁷.

For example, Slovakia has applied a “Swedish” model of railway development, according to which the railway infrastructure manager and the main railway operator remain state-owned and subsidized, but all responsibilities are divided between them. Instead, Poland remains vertically integrated in the railway transport and manages it within the framework of the holding company, similar to the “German” model. In turn, the Czech Republic and Hungary use the “French” model, according to which individual companies are responsible for managing and charging for logistics and infrastructure. And these companies, at first glance, are independent, but are associated with the main transport company, which remains a monopolist in the public sector. In view of this, it was found that the problem of such organizational integration, which remains dependent on the state, can be formulated in the question “how to ensure free competition if preference is given to the largest company”.

Thus, a common point in the development of railway infrastructure in the Visegrad Group countries was that to increase its operational efficiency, for example, in Hungary, Slovakia and Poland, several industry units were closed, resulting in the gradual shutdown of more than

²⁶ Kelemen-Erdos A., Measuring Railway Market Attractiveness: Evidence from Visegrad Countries, *“Acta Polytechnica Hungarica”* 2011, vol 8, nr 5, s. 151–170.

²⁷ Nash C., Passenger Railway Reform in the Last 20 Years – European experience reconsidered, *“Research in Transportation Economics”* 2008, vol 22, nr 1, s. 61–70.

10,000 km of railways/ tracks over the past two decades²⁸. In addition, between 1996 and 2009, averages of four percent of railway workers were laid off each year in the Visegrad Group countries. As a result, the wage rate has fallen by more than 40 percent since 1996, and the number of employees still exceeds the EU average²⁹. All this led to a situation according to which the decline in the level of railway development in the countries of the region was bilateral: on the one hand, due to the growing pace of car ownership and automotive motorization; on the other hand, due to significant gaps in technological development related to the circumstances and flexibility of travel and transportation, in particular compared to other modes of transport.

However, the situation has become extremely critical in the transportation of goods, although it has remained moderate (especially in Slovakia and the Czech Republic, where there has even been an improvement) in the transportation of passengers³⁰. As a result, only about 20 percent of all freight is transported by rail in the region today³¹. At the same time, the supply and coverage of the Czech railway infrastructure covers the country most widely in the region, and Poland is characterized by the best equipment of sensors and electricity, which is most favorable for the entry of new operators. At the same time, the supply and coverage of the Czech railway infrastructure covers the country most widely in the region, and Poland is characterized by the best equipment of sensors and electricity, which is most favorable for the entry of new operators. In turn, Hungary is characterized by the low quality of double and wider railway lines, which causes traffic jams and generates congestion effects, thus leading to customer dissatisfaction. Finally, the Czech Republic, as a transit country, still has a low level of involvement of its railways in the Trans-European Transport Network. At the same time, one of the interesting paradoxes is observed in the example of Hungary, where the modal distribution of the market for passenger transport by rail is the highest in the region, even though the efficiency of railways is declining and transport tariffs are raising significantly³².

The situation is compounded by the fact that the most centralized market for passenger transport by rail is in Slovakia, although the productivity and modal share of rail transport in this country are quite low. As for the Polish railway, it is the most competitive and liberalized in the region, and therefore the most attractive, although tariffs on the Polish market exceed the EU average. Finally, it is only in the Czech Republic over the last decade that rail freight has started to grow.

²⁸ Kelemen-Erdos A., Measuring Railway Market Attractiveness: Evidence from Visegrad Countries, "Acta Polytechnica Hungarica" 2011, vol 8, nr 5, s. 151–170.

²⁹ *Employment in principal railway enterprises: by type of activity*, Eurostat, źródło: <https://data.europa.eu/euodp/data/dataset/H3RVgyEklljO4sIEpctkzQ> [odczyt: 20.10.20].

³⁰ *Operators' traffic*, International Union of Railways 2011, źródło: <http://www.uic.org/spip.php?article1348> [odczyt: 20.10.20].

³¹ *Modal split of passenger transport*, Wyd. Eurostat, źródło: https://ec.europa.eu/eurostat/en/web/products-datasets/-/TRAN_HV_PSMOD [odczyt: 20.10.20]; *Operators' traffic*, International Union of Railways 2011, źródło: <http://www.uic.org/spip.php?article1348> [odczyt: 20.10.20].

³² *HICP-annual average indices for transport prices*, Wyd. European Environment Agency, źródło: <https://www.eea.europa.eu/data-and-maps/data/external/hicp-annual-average-indices-for> [odczyt: 20.10.20].

It should also be noted that the development of railway transport in the Visegrad countries is hampered by the “naturalness of monopolistic” influence on the part of the EU³³. The fact is that within the EU the model of regulation of natural monopolies provides for the separation of natural monopolies from potentially competitive activities and privatization of the latter, taking into account the complexities of the transition to a competitive environment and combining two regulatory policies (introduction of competition mechanisms and state regulation). Thus, on the one hand, the Visegrad countries (as members of the EU) have a relative advantage, as they have the opportunity to synthesize the advantages of different approaches to the formation of a new model of regulation of “naturally monopolistic industries”. On the other hand, the difference lies in the different role played by the railway sector, as well as in the fact that the starting positions and problems faced by the countries of the region have been and remain different.

Historically determined problem is that in the region railway transport specialized in freight, not passenger transport (in particular due to the peculiarities of the regimes of “real socialism”). Thus, with the beginning of the introduction of the methods of “natural monopolies” in the railway sector, the countries of the Visegrad Group found themselves in a significantly worse situation than the countries of Western Europe. The explanation is that in the countries of the region, the railways used to be (until the early 1990s) the only state-owned enterprises bound by obligations to perform socially significant and other types of economically unprofitable transportation, and at the same time enjoyed the support of states. However, recently, in particular due to the development of other modes of transport (primarily road) and the associated reduction in freight and passenger transport by rail, especially in the light of European policy in this area, the status of the analyzed sector has changed and failed to reach the level of neither the automotive sector nor the countries of Western Europe. Even though the processes of transforming railways into state-independent enterprises and companies with the division of responsibilities for infrastructure management and organization of transportation activities have become active in the region (see Table 3 for more)³⁴. In the cluster context, the problem is intensified by the fact that during and after the integration of the Visegrad countries into the EU, priority was given to meeting the requirements of economic and social development of the EU. Therefore, given that the countries of the region had a fairly long railway network, it was decided to postpone the process of their modernization and harmonization, but instead focused primarily on the construction of new roads.

Accordingly, due to the initial underfunding of the railway sector in the past and currently, it was decided to ensure economic growth in the region primarily due to the increased

³³ Lysytsa E., Rynochnye uslovia razvytyia estestvennykh monopolii v stranakh Tsentralnoi y Vostochnoi Evropy (na primere zheleznodorozhnogo transporta) // *Visnyk Pryjazovskoho Derzhavnogo Tekhnichnogo Universytetu (Serii: Ekonomichni nauky)* 2011, vol 2, nr 22, s. 36–44.

³⁴ Lysytsa E., Rynochnye uslovia razvytyia estestvennykh monopolii v stranakh Tsentralnoi y Vostochnoi Evropy (na primere zheleznodorozhnogo transporta) // *Visnyk Pryjazovskoho Derzhavnogo Tekhnichnogo Universytetu (Serii: Ekonomichni nauky)* 2011, vol 2, nr 22, s. 36–44.

development of road transport. This means that current and short-term economic expectations have been more important than long-term losses from the decline of the railway sector in the region. As a result, the railway reforms of the Visegrad Group began to come under political and economic pressure, on the one hand, and to support it, on the other. Although, in contrast, it was the emergence of financial difficulties due to pressure from market forces or the mistakes of governments that led to the reform of the railway in the region.

Table 3. Number of companies engaged in logistics and infrastructure of railway transport in the countries of the Visegrad Group (in the dynamics, as of 2007–2016)

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poland	39	43	47	48	57	58	69	69	72	75
Slovakia	9	12	15	16	14	14	17	16	16	16
Hungary	2	2	2	16	:	47	52	52	52	52
Czech Republic	20	23	24	24	28	30	32	34	43	47
In Average	18	20	22	26	33	37	43	43	46	48

Źródło: *Transport Database*, Wyd. Eurostat, źródło: <https://ec.europa.eu/eurostat/web/transport/data/database> [odczyt: 20.10.20]; *Carriage of goods by road, mln tonne-km, year 2018*, Wyd. UNECE, źródło: <https://w3.unece.org/PXWeb/en> [odczyt: 20.10.20].

All this means that against the background of the development of various modes of transport in the countries of the region, the railway sector needs to be adjusted primarily in relation to the transportation and transportation of goods, which can significantly increase the competitiveness of railways³⁵. Moreover, it is established that it is appropriate to do so through closer cooperation between the countries of the region, more effective development of a unified system of support for multimodal transport, development of necessary and appropriate IT solutions (to increase rail market share, competitiveness and efficiency of international freight and passenger transport) at borders, increasing the speed of railways (for faster transportation of passengers, goods and services) and the number of locomotives, increasing the share of combined freight transport by rail, avoiding benefits for certain transport companies, establishing a much better price-quality ratio, etc³⁶.

This is especially true given that rail freight in the Visegrad Group is characterized by such a complex problem of supplying goods to the customer as the “last mile”³⁷ problem, which is solved mainly by intermodal transport, which is quite underdeveloped in the region³⁸.

³⁵ Lukacs A., *Shifting freight from truck to rail, based on Hungary's experience*, Wyd. Clean Air Action Group 2010.

³⁶ Jerney Z., Bodnar K., Action Plan on the Competitiveness of the Railway Freight Transport in the Visegrad (V4) Cooperation Area, “*Lucrari Ftiinifici*” 2018, vol 20, nr 2, s. 65–70; Dolinayova A., Camaj J., Kanis J., Charging railway infrastructure models and their impact to competitiveness of railway transport, “*Transport Problems*” 2017, vol 12, nr 1, s. 139–150; Dolinayova A., Loch M., Camaj J., Liberalization of the railway freight market in the context of a sustainable transport system, “*Transportation Research Procedia*” 2016, vol 14, s. 916–925.

³⁷ Cempirek V., Vrbova P., Zakorova E., *The Possibility of Transferring the Transport Performance on Railway Transport*, Presented at LOGI 2017: MATEC (Web of Conferences).

³⁸ Kelemen-Erdos A., *A kozforgalmu kozlekedesi szolgaltatas es piac vizsgalata marketing es fenntarthatosagi nezopontbol: PhD thesis*, Wyd. BMGE GTK 2014.

Reform measures have been partially successful, for example, in Poland, especially since 2012, when a series of changes resulted in the necessary structure of the industry. This was reflected in the adoption of commercial management principles in the Polish railway sector, fully supported by the government. As a result, the results of the reform began to emerge: proper allocation of funds, financial stability of key subsidiaries, and improved service delivery. As a result, productivity has increased and the infrastructure of the Polish railway sector has improved. However, before that (in particular before 2012) a number of measures had already been taken in Poland in this area, in particular: labor productivity on the railway has been increased; financial resources and debt have been partially restructured; a responsibility for the implementation of a number of non-core areas have been partially restructured to other ministries and departments; some categories of employees were given the opportunity to receive severance pay; organizational restructuring measures were taken to transform the railway into a holding company and prepare for the free involvement of the private sector in subsidiaries through commercialization; restructuring has begun to improve the quality of assets and ownership. For the most part, only appropriate management was needed to effectively manage the operation of the railways to achieve commercial goals. As a result, since 2012, measures have been aimed at solving such systemic problems as: 1) contractual provision of public services and reduction of the debt burden; 2) investment process; 3) safety and customer satisfaction; 4) corporate governance standards. As a result, the reform measures stimulated competition in the field of rail transport, because: the share of freight traffic owned by private companies-operators in ton-kilometers increased by 40 percent; volumes, quality and safety of passenger traffic have also been increased significantly; financial revenue indicators have been increased or at least stabilized, and the debt burden decreased; competition in the market of freight and passenger rail transport has been increased.

Somewhat different, albeit less effective, measures were once taken in Hungary³⁹. In this country, between 1991 and 2000, the share of railways in all passenger traffic decreased to 10 percent, while the share of road transport, especially private, increased to 87 percent.

In turn, the situation in freight traffic was similar, as the share of railways fell to 30 percent, and road transport increased to 51 percent. Management found that the main reason for this was a change in the structure of traffic with a sharp decrease in the volume of bulk cargo and the transition of more valuable and usually light goods, such as consumer goods, to road transport. Therefore, the urgent need was to transform the Hungarian State Railways into a competitive market-oriented enterprise.

In this regard, measures such as: writing off and restructuring of old debts; abolition of fixed subsidies and their replacement by obligations to fully reimburse the costs of servicing socially necessary transportation, allowing third parties to access the use of railway infrastructure; preservation of infrastructure under state control while ensuring the universality of its use,

³⁹ Cherednychenko O., Shliakhy restrukturyzatsii zaliznychnoho transportu v suchasnykh umovakh na prykladi krain Yevropy, "Viznyk ekonomiky transportu i promyslovosti" 2009, vol 26, s. 44–51.

in particular by foreign operators; financial distribution of infrastructure and operational activities of railways; transition of operational activity to a commercial basis; introduction of self-financing in the sector have been suggested and partially implemented. Based on such recommendations and actions, the railways in Hungary, as well as the railways in the Czech Republic, Poland and Slovakia, have made progress in the liberalization, deregulation and privatization of property. At the same time, such changes did not contribute to the allocation of operations, infrastructure and the creation of independent administrations for these sectors⁴⁰.

As for the Czech Republic and Slovakia, the decrease in the popularity of railway transport was primarily due to such factors as: non-competitiveness against the background of the development of Western railways; development of other modes of transport⁴¹. However, rail transport in these countries remains quite popular historically, as a result of which its reduction is much smaller than in other countries in the region. This is reflected, for example, in the fact that the Czech Republic still has one of the densest railway networks in Europe, in particular due to the important role of its international and local connections. The situation is somewhat worse in Slovakia⁴². All this suggests that in these countries not only national and international, but also local railways remain important, although they are at risk⁴³, especially in Slovakia, where at the beginning of the 21st century their significant reduction and optimization began⁴⁴.

In general, it is motivated that in the Visegrad countries there are at least three groups of countries in terms of the level of reform of their railways - with high, medium and low levels of reforms⁴⁵.

This is assessed on the basis of such indicators as regulatory framework, organizational form, management system, competition, access to the private sector market, coverage of losses in the passenger sector. In practice, this is reflected in the fact that the key essence of the reforms in the region was aimed at generating three models of railway transport development, in particular: a) models of full separation of the infrastructure operator from the railway department (Slovakia); b) the model of creation of the administration, according to the status close to the state one, which is entrusted with the functions of development and maintenance of the railway infrastructure (Czech Republic); c) models of the holding structure creation within which separate companies on infrastructure and operational activity on the railway (Poland and Hungary) function⁴⁶. Although they are synthesized by the fact that in these countries

⁴⁰ Problemy rozvytytia zheleznykh doroh stran Vostochnoi Evropy, „Zheleznyye dorohy myra“ 2000, vol 2, s. 2–16.

⁴¹ Seidenglanz D., *International Railway Transport in the Czech Republic and in Slovakia*, [w:] *History of Transport, Traffic, and Mobility*, Wyd. Université Paris 1 2006, s. 1–9.

⁴² Taczanowski J., *A comparative study of local railway networks in Poland and the Czech Republic*, [w:] Szymanska D., Bieganska J. (eds.), *Bulletin of Geography. Socio-economic Series: No. 18*, Wyd. Nicolaus Copernicus University Press 2012, s. 125–138.

⁴³ Marada M., Kveton V., Vondrackova P., Zeleznicni doprava jako faktor regionalniho rozvoje, „Narodohospodarsky obzor“ 2006, vol 4, s. 58.

⁴⁴ Hornak M., Pozicia zeleznicnej dopravy na Slovensku – stagnacia alebo upadok?, „Narodohospodarsky obzor“ 2006, vol 4, s. 22.

⁴⁵ *Rail liberalization index 2007*, Wyd. IBM Corporation 2008, s. 23–24.

⁴⁶ Lysytsa E., Rynochnye usloviya rozvytytia estestvennykh monopolii v stranakh Tsentralnoi y Vostochnoi Evropy (na primere zheleznodorozhnogo transporta) // „Vistnyk Pryazovskoho Derzhavnogo Tekhnichnogo Universytetu (Serii: Ekonomichni nauky)” 2011, vol 2, nr 22, s. 36–44.

there are appropriate authorities on the railway. However, in one case such actions stopped the decline of the railway sector, and in another they continued it.

Additionally, it is interesting that the railway systems of the Visegrad Group countries suit various reform options, including full separation (Czech Republic and Slovakia), partial separation (Hungary) and partial integration (Poland)⁴⁷. In the first case, there was a complete separation in terms of legal, organizational and institutional conditions, infrastructure management was positioned as an independent process, and transport entities gained access to tracks and stations on a contract basis with the infrastructure owner. In the second case, there was an organizational and legal separation of the infrastructure manager and the subjects of transport activities, but there remained a centralized body of railway transport management responsible for the key functions of infrastructure management. Finally, in the third case, the infrastructure manager and the railway operator were separated organizationally, although they are branches of the same holding company. As a result, they began to operate to achieve common strategic and commercial goals, located in a monopolized rail market. This provided more effective coordination of infrastructure management activities and infrastructure maintenance conditions. Although in general the countries of the Visegrad Group are still characterized by declining incomes, weakening market positions, deteriorating assets, as well as unstable operational productivity in the railway sector. Thus, despite some changes in the sector, the market for rail (freight, passenger, public or private) services in the Visegrad Group continues to decline⁴⁸.

In general, this means that due to the fact that railway transport at the beginning of socio-economic reforms was left in almost the same state as before, a very noticeable modal split between road and rail transport has been generated in the near future. As a result, the transportation of passengers and freights began to mix systematically and purposefully from the railway sector to the road sector, mostly private. For example, between 1990 and 1992, the share of railways in freight transport decreased from 22.2 to 14.8 percent, while the share of cars in this process increased from 74.4 to 82.4 percent⁴⁹.

Such processes have continued in the future and continue to this day and are often explained by the fact that the new fragmented road transport industry has lost the “economies of scale” that existed with the old monopolies on rail transport. A further consequence of such processes was the improvement of road transport infrastructure, in particular the system of existing roads. This became especially clear, tangible and necessary when the Visegrad Group countries failed to privatize the railway transport sector and passenger and freight flows began

⁴⁷ Mishchenko M., Problemy vertykalnoho rozdilennia zaliznyts yevropeiskoho sektora, *“Visnyk Dnipropetrovskoho natsionalnoho universytetu zaliznychnoho transportu im. akad. V. Lazariana”* 2012, vol 40, s. 289–295.

⁴⁸ Seidenglanz D., *International Railway Transport in the Czech Republic and in Slovakia*, [w:] *History of Transport, Traffic, and Mobility*, Wyd. Université Paris 1 2006, s. 1–9; Ivan I., Dochazka na zastavku a její vliv na dojazdku do zamestnani, *“Geografie”* 2010, vol 4, s. 394.

⁴⁹ Waters C., Changes to road transport in Poland during a period of economic transition, *“International Journal of Physical Distribution & Logistics Management”* 1999, vol 29, nr 2, s. 122–138.

to shift to a more flexible, cheap and organized road transport sector, primarily due to an increase in the number of road vehicles. This is especially noticeable against the background of marginal development or the decline of rail transport, which can't encourage private carriers to use its capacity to replace or supplement road transport (this was discussed above). Thus, in the end, it is argued that in the countries of the Visegrad Group has long been a radical split between rail and road transport. Moreover, in practice, it is implemented mainly in favor of road transport, which has a predominant share in the transportation of goods, services, cargo and passengers, as it is characterized by significantly better logistics and infrastructure. Perhaps the only indicator in which rail transport in the region still wins is its relative environmental friendliness and safety.

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